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Time-series measurements of oxygen consumption of copepod nauplii

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Abstract:

The goal of this study was to determine over time with high temporal resolution the oxygen consumption rates of nauplii of marine planktonic copepods while feeding on phytoplankton at environmental concentrations. The determination of the nauplii's oxygen consumption was achieved by applying a fluorescence-based non-invasive technology. The hourly oxygen consumption at 21°C ranged from near 18 nl O₂ Nauplius IV⁻¹ to about 33 nl O₂ Nauplius VI⁻¹ of the calanoid *Eucalanus pileatus*. The nauplii's feeding activity was reflected by an average reduction of food concentration of about 50% of the initial abundance and a production of 2.2 pellets nauplius⁻¹ h⁻¹. The nauplii's average food consumption, at a rate equal to 17.7% of body weight d⁻¹, did not cover their metabolic expenses of 29.7% of body weight d⁻¹. Their feeding performance could have been to some extent limited by the size of the experimental vessels. Microscopic observations showed that the motion of late nauplii of *E. pileatus* was continuous (i.e. as previously observed) in vessels of 250 ml and larger. The main finding of this study is that the metabolic activity of minute metazooplankton organisms, while they are feeding, can now be determined with good precision over a period of hours without any invasion of the experimental vessels.

Key-words: Oxygen consumption, nauplii, time-series, oxygen sensor spots